

Having described the invention, what is claimed is:

1. A sortation system comprising:
  - a longitudinally extending monolithic monorail track, the monorail track comprising:
    - a U-shaped upper wheel engaging section;
    - a U-shaped lower wheel engaging section;
    - a U-shaped power section, the upper section being connected to an upper portion of the power section and the lower section being connected to a lower portion of the power section; and
    - two longitudinally extending mounting flanges, each mounting flange having a U-shape, one side of the mounting flange U-shape being coincident with a portion of one side of one of the upper wheel engaging section and the lower wheel engaging section; and one side of the mounting flange U-shape being coincident with a portion of one side of the power section,
    - the upper wheel engaging section U-shape having its open side facing downward, the lower wheel engaging section U-shape having its open side facing upward, and the power section U-shape having its open side facing horizontally; and the upper wheel engaging section U-shape open side, the lower wheel engaging section U-shape open side and the power section U-shape open side all facing towards a common center;
    - a plurality of interconnected cars, at least one car being a drive car, and at least one car being an article conveying car, each car comprising:
      - an interconnection connecting one car to an adjacent car, the interconnection including a mechanical connection and an electrical connection; and
      - a plurality of wheel assemblies, each wheel assembly engaging the track, each wheel assembly comprising:
        - a plurality of spaced apart side wheels, the side wheels rotating about a vertical axis, one side wheel engaging the upper wheel engaging section, the other side wheel engaging the lower wheel engaging section; and

an end wheel, the end wheel rotating about a horizontal axis,  
the end wheel engaging one of the upper wheel engaging section and  
the lower wheel engaging section, the end wheel including a caster  
swiveling about a vertical axis;

each drive car comprising:

a drive car frame;

two wheel assemblies attached to the drive car frame;

a motor and drive wheel assembly attached to the drive car  
frame, the motor and drive wheel assembly being vertically movable  
relative to the drive car frame, a drive wheel of the motor and drive  
wheel assembly engaging the track, the drive wheel being positioned  
between the wheel assemblies, the motor and drive wheel assembly  
comprising: a cantilever bar attached to a rear part of the motor and  
drive wheel assembly, a portion of the cantilever bar distal from the  
motor and drive wheel assembly being attached to the drive car frame;  
and a slide assembly mounted between the rear part of the motor and  
drive wheel assembly and the drive car frame, the slide assembly com-  
prising a slide slidably fitting within a slotted member, the slide as-  
sembly permitting the motor and drive wheel assembly to move verti-  
cally relative to the drive car frame;

a wireless control signal receiver;

a control signal transmission device adapted to transmit control  
signals to another drive car and to an article conveying car; and

a controller, the controller receiving control signals from the  
receiver, transmitting control signals to the motor and drive assembly  
and transmitting control signals for at least one of another drive car and  
an article conveying car to the control signal transmission device,  
wherein the wireless control signal receiver, the control signal trans-  
mission device and the controller include a CAN<sup>®</sup> bus network and  
wherein the electrical connection is electrically connected to the con-  
trol signal transmission device;

each article conveying car comprising:

an article conveying frame comprising two side plates connected by a plurality of cross bars, and a reduced friction plate having a groove therein;

three rollers rotatably attached to the frame, the three rollers being arranged in a triangle, each roller having a groove thereabout, one of the rollers being translatably movable;

an endless movable belt about the rollers, the belt having a rib extending therefrom, the belt rib tracking in at least one of the reduced friction plate groove and the roller grooves;

two wheel assemblies attached to the frame;

a bi-direction position controllable belt drive attached to the frame and operably connected to one of the rollers.

2. A sortation system comprising:
  - a longitudinally extending monorail track;
  - a plurality of interconnected cars, at least one car being a drive car, and at least one car being an article conveying car.
3. The sortation system according to claim 2, wherein at least one car is a drive and article conveying car.
4. The sortation system according to claim 3, wherein the drive and article conveying car includes a linear induction drive.
5. The sortation system according to claim 2, further comprising:
  - an interconnection connecting one car to an adjacent car, the interconnection including a mechanical connection and an electrical connection.
6. The sortation system according to claim 2, wherein the monorail track comprises:

an upper wheel engaging section;  
a lower wheel engaging section; and  
a power section, the upper section being connected to an upper portion of the power section and the lower section being connected to a lower portion of the power section.

7. The sortation system according to claim 6, wherein each car includes a plurality of wheel assemblies, each wheel assembly engaging the track, each wheel assembly comprising:

a plurality of spaced apart side wheels, the side wheels rotating about a vertical axis, one side wheel engaging the upper wheel engaging section, the other wheel engaging the lower wheel engaging section; and

at least one end wheel, the at least one end wheel rotating about a horizontal axis, the end wheel engaging one of the upper wheel engaging section and the lower wheel engaging section.

8. The sortation system according to claim 7, wherein the at least one end wheel is at a lower end of the of the wheel assembly.

9. The sortation system according to claim 7, wherein the at least one end wheel is at an upper end of the of the wheel assembly.

10. The sortation system according to claim 9, wherein there are at least two wheel assemblies, the car having a forward direction of travel, the forwardmost wheel assembly having the at least one end wheel at the upper end of the wheel assembly.

11. The sortation system according to claim 6, wherein the upper wheel engaging section, the lower wheel engaging section and the power section each have a U-shape.

12. The sortation system according to claim 11, wherein the upper wheel engaging section U-shape has its open side facing downward, the lower wheel engaging section U-shape has its open side facing upward, and the power section U-shape has its open side facing horizontally; and the upper wheel engaging section U-shape open side, the lower wheel engaging section U-shape open side and the power section U-shape open side all facing towards a common center.

13. The sortation system according to claim 6, wherein the upper wheel engaging section and the lower wheel engaging section are spaced apart, the track having a closed side being closed by the power section and an open side opposite the power section, the open side being between the upper wheel engaging section and the lower wheel engaging section.

14. The sortation system according to claim 6, further comprising:  
a multi-conductor power bus mounted within the power section.

15. The sortation system according to claim 14, wherein the at least one drive car and the at least one article conveying car each have a brush assembly slidably engaging the power bus.

16. The sortation system according to claim 6, wherein the monorail track further comprises: at least one longitudinally extending mounting flange.

17. The sortation system according to claim 16, wherein the mounting flange has a U-shape, one side of the mounting flange U-shape being coincident with a portion of one side of one of the upper wheel engaging section and the lower wheel engaging section; and one side of the mounting flange U-shape being coincident with a portion of one side of the power section.

18. The sortation system according to claim 17, wherein there are two longitudinally extending mounting flanges.

19. The sortation system according to claim 6, wherein the monorail track is monolithic.
20. The sortation system according to claim 2, wherein each car includes a plurality of wheel assemblies, each wheel assembly engaging the track, each wheel assembly comprising:
- a plurality of spaced apart side wheels; and
  - at least one end wheel, the at least one end wheel rotating about a horizontal axis.
21. A sortation system comprising:
- a longitudinally extending monolithic monorail track comprising:
    - an upper wheel engaging section;
    - a lower wheel engaging section; and
    - a power section, the upper section being connected to an upper portion of the power section and the lower section being connected to a lower portion of the power section;
    - a multi-conductor power bus mounted within the power section;
    - two longitudinally extending mounting flanges, each mounting flange having a U-shape, one side of the mounting flange U-shape being coincident with a portion of one side of one of the upper wheel engaging section and the lower wheel engaging section; and another side of the mounting flange U-shape being coincident with a portion of one side of the power section,
  - wherein the upper wheel engaging section and the lower wheel engaging section are spaced apart, the track has a closed side being closed by the power section and an open side opposite the power section, the open side being between the upper wheel engaging section and the lower wheel engaging section;

a plurality of interconnected cars, at least one car being a drive car, and at least one car being an article conveying car, the at least one drive car and the at least one article conveying car each have a brush assembly slidably engaging the power bus.

22. A sortation system comprising:

a longitudinally extending monorail track;

a plurality of interconnected cars, at least one car being a drive car, and at least one car being an article conveying car, each car includes two wheel assemblies, each wheel assembly engaging the track, each wheel assembly comprising:

two vertically spaced apart side wheels, the side wheels rotating about a vertical axis; and

an end wheel, end wheel rotating about a horizontal axis, the end wheel being a caster, the caster swiveling about a vertical axis.

23. The sortation system according to claim 22, wherein the end wheel of one wheel assembly is at an upper end of the wheel assembly and the end wheel of the other wheel assembly is at a lower end of the wheel assembly.

24. The sortation system according to claim 22, wherein the end wheel of each wheel assembly is at a lower end of the wheel assembly.

25. A track comprising:

a longitudinally extending monolithic monorail track having:

an upper wheel engaging section;

a lower wheel engaging section;

a power section, the upper section being connected to an upper portion of the power section and the lower section being connected to a lower portion of the power section; and

a multi-conductor power bus mounted within the power section,

wherein the upper wheel engaging section, the lower wheel engaging section and the power section each have a U-shape, wherein the upper wheel engaging section

U-shape has its open side facing downward, the lower wheel engaging section U-shape has its open side facing upward, and the power section U-shape has its open side facing horizontally; and the upper wheel engaging section U-shape open side, the lower wheel engaging section U-shape open side and the power section U-shape open side all facing towards a common center.

26. The track according to claim 25, further comprising:

two mounting flanges, each mounting having has a U-shape, one side of the mounting flange U-shape being coincident with a portion of one side of one of the upper wheel engaging section and the lower wheel engaging section; and one side of the mounting flange U-shape being coincident with a portion of one side of the power section.

27. A drive car adapted for drivingly engaging a track comprising:

a frame;

a plurality of wheel assemblies attached to the frame; and

a motor and drive wheel assembly attached to the frame, the motor and drive wheel assembly being vertically movable relative to the frame, a drive wheel of the motor and drive wheel assembly being adapted to drivingly engage the track.

28. The drive car according to claim 27, wherein there are two wheel assemblies and the drive wheel is positioned between the wheel assemblies.

29. The drive car according to claim 27, wherein each wheel assembly comprises: a plurality of spaced apart side wheels, the side wheels rotating about a vertical axis; and an end wheel, the end wheel rotating about a horizontal axis.

30. The drive car according to claim 29, wherein the end wheel comprises a caster swiveling about a vertical axis.



31. The drive car according to claim 29, wherein there are two wheel assemblies, the drive car having a forward direction of travel, one wheel assembly having the end wheel at an upper end of the wheel assembly and being forward of the other wheel assembly, the end wheel of the other wheel assembly being at a lower end of the wheel assembly.

32. The drive car according to claim 27, wherein a rear end of the motor and drive wheel assembly is attached to the frame.

33. The drive car according to claim 32, further comprising a cantilever bar attached to the rear end of the motor and drive wheel assembly, a portion of the cantilever bar distal from the motor and drive wheel assembly being attached to the frame.

34. The drive car according to claim 32, further comprising a slide assembly mounted between the rear end of the motor and drive wheel assembly and the frame, the slide assembly comprising a slide slidably fitting within a slotted member, the slide assembly permitting the motor and drive wheel assembly to move vertically relative to the frame.

35. The drive car according to claim 27, wherein the motor and drive wheel assembly includes a right angle gear reducer between a motor of the motor and drive wheel assembly and the drive wheel.

36. The drive car according to claim 27, wherein the motor of the motor and drive wheel assembly is a position controllable drive motor.

37. The drive car according to claim 27, further comprising:  
a wireless control signal receiver; and  
a control signal transmission device adapted to transmit control signals to another drive car and to an article conveying car.

38. The drive car according to claim 37, further comprising:  
a controller, the controller receiving control signals from the receiver, transmitting control signals to the motor and drive wheel assembly and transmitting control signals for at least one of another drive car and an article conveying car to the control signal transmission device.
39. The drive car according to claim 38, wherein the wireless control signal receiver, the control signal transmission device and the controller include a CAN<sup>®</sup> bus network.
40. The drive car according to claim 38, further comprising:  
an interconnection adapted to connect a drive car to one of another drive car and an article conveying car, the interconnection including a mechanical connection and an electrical connection.
41. The drive car according to claim 39, wherein the electrical connection is electrically connected to the control signal transmission device.
42. A drive car adapted for drivingly engaging a track comprising:  
a frame;  
a two wheel assemblies attached to the frame, each wheel assembly comprising: a plurality of spaced apart side wheels, the side wheels rotating about a vertical axis; and an end caster wheel, the end caster wheel rotating about a horizontal axis, the drive car having a forward direction of travel, one wheel assembly having the end wheel at an upper end of the wheel assembly and being forward of the other wheel assembly, the end wheel of the other wheel assembly being at a lower end of the wheel assembly; and  
a motor and drive wheel assembly attached to the frame, the motor and drive wheel assembly being vertically movable relative to the frame, a drive wheel of the motor and drive wheel assembly being adapted to drivingly engage the track, the motor and drive wheel assembly comprising: a cantilever bar attached to a rear part of

the motor and drive wheel assembly, a portion of the cantilever bar distal from the motor and drive wheel assembly being attached to the frame; and a slide assembly mounted between the rear part of the motor and drive wheel assembly and the frame, the slide assembly comprising a slide slidably fitting within a slotted member, the slide assembly permitting the motor and drive wheel assembly to move vertically relative to the frame, the drive wheel being positioned between the wheel assemblies.

43. The drive car according to claim 42, further comprising:  
a wireless control signal receiver; and  
a control signal transmission device adapted to transmit control signals to another drive car and to an article conveying car.

44. An article conveying car adapted for movably engaging a track comprising:  
a frame;  
an endless movable belt;  
at least three rotatable rollers attached to the frame, the movable belt being positioned about the rollers; and  
at least one of the rollers being translatably moveable relative to the movable belt.

45. The article conveying car according to claim 44, further comprising an adjuster attached to each end of the translatably movable roller.

46. The article conveying car according to claim 45, wherein the adjuster includes a threaded apparatus attached to the translatably movable roller.

47. The article conveying car according to claim 44, wherein there are only three rotatable rollers, only one of the three rollers being translatably movable.

48. The article conveying car according to claim 44, wherein the at least three rollers are arranged in a triangle.

49. The article conveying car according to claim 44, wherein the movable belt is bi-directionally movable.
50. The article conveying car according to claim 44, further comprising a low friction plate attached to the frame and positioned below a portion of the belt.
51. The article conveying car according to claim 44, further comprising:  
a belt alignment system comprising a first alignment member on the belt and a second alignment member on at least one of the frame and at least one roller, the first alignment member engaging the second alignment member.
52. The article conveying car according to claim 51, wherein the first alignment member comprises a rib on the underside of the belt and the second alignment member comprises a groove.
53. The article conveying car according to claim 52, wherein the second alignment member comprises a groove in the at least three rollers.
54. The article conveying car according to claim 52, wherein the frame includes a reduced friction plate below a portion of the belt and the second alignment member comprises a groove in the plate.
55. The article conveying car according to claim 44, further comprising:  
a plurality of wheel assemblies attached to the frame, each wheel assembly adapted to engage the track, each wheel assembly comprising:  
a plurality of spaced apart side wheels, the side wheels rotating about a vertical axis; and  
at least one end wheel, the at least one end wheel rotating about a horizontal axis.

56. The article conveying car according to claim 55, wherein the at least end one wheel comprises a caster swiveling about a vertical axis.
57. The article conveying car according to claim 55, wherein the at least one end wheel is positioned at a lower end of the wheel assembly.
58. The article conveying car according to claim 44, further comprising a position controllable drive attached to the frame and operably connected to the belt.
59. The article conveying car according to claim 58, wherein the position controllable drive is bi-directional.
60. The article conveying car according to claim 58, wherein at least one roller is a drive roller and has a sprocket thereon, and the position controllable drive includes a timing belt engaging the sprocket.
61. The article conveying car according to claim 60, wherein the sprocket is integrally formed with the drive roller.
62. The article conveying car according to claim 44, further comprising:  
an interconnection adapted to connect one article conveying car to one of a drive car and another article conveying car, the interconnection including a mechanical connection and an electrical connection.
63. The article conveying car according to claim 44, further comprising:  
a plate extending away from the frame, the plate adapted to slidably fit beneath the belt on an adjacent article conveying car.
64. The article conveying car according to claim 63, wherein the plate has a rectangular shape.

65. An article conveying car comprising:  
a frame comprising two side plates connected by a plurality of cross bars;  
three rollers rotatably attached to the frame, the three rollers being arranged in a triangle;  
an endless movable belt about the rollers;  
two wheel assemblies attached to the frame, each wheel assembly comprising:  
a plurality of spaced apart side wheels, the side wheels rotating about a vertical axis;  
and an end wheel caster at a lower end of the wheel assembly, a wheel of the end wheel caster rotating about a horizontal axis;  
a bi-direction position controllable belt drive attached to the frame and operably connected to one of the rollers; and  
an interconnection adapted to connect one article conveying car to one of a drive car and another article conveying car, the interconnection including a mechanical connection and an electrical connection.
66. The article conveying car according to claim 65, further comprising a car drive attached to the frame and adapted to drivingly engage a track.
67. The article conveying car according to claim 66, wherein the car drive is a linear induction drive.
68. An article conveying car comprising:  
a frame comprising two side plates connected by a plurality of cross bars, and a reduced friction plate having a groove therein;  
three rollers rotatably attached to the frame, the three rollers being arranged in a triangle, each roller having a groove therein;  
an endless movable belt about the rollers, the belt having a rib extending therefrom, the belt rib tracking in at least one of the reduced friction plate groove and the roller grooves;  
two wheel assemblies attached to the frame; and

a bi-direction position controllable belt drive attached to the frame and operably connected to one of the rollers.